IN THE CLAIMS:

1. (Currently Amended): A method for a storage operating system implemented in a storage system to optimize the amount of readahead data retrieved for a read stream established in a data container stored in the storage system, the method comprising:

    receiving a client read request at the storage system, the client read request indicating client-requested data for the storage operating system to retrieve from the data container containing the read stream;

    determining whether the storage operating system is permitted to retrieve readahead data from the data container in response to the received client read request;

    if it is determined that the storage operating system is permitted to retrieve readahead data from the data container, performing the steps of:

        (i)   selecting an amount of readahead data to retrieve from the data container based on ~~one or more~~ <u>a plurality of</u> factors; and

        (ii)   retrieving the selected amount of readahead data from the data container.

2. (Original): The method of claim 1, wherein the data container is a file, directory, vdisk or lun.

3. (Original): The method of claim 1, wherein the storage operating system is determined to be permitted to retrieve readahead data from the data container when the client-requested data extends the read stream past a predetermined next readahead value.

4. (Original): The method of claim 3, wherein the predetermined next readahead value is stored in a readset data structure associated with the read stream.

5. (Original): The method of claim 3, wherein the predetermined next readahead value is updated based on a percentage of the selected amount of readahead data.

6. (Currently Amended): The method of claim 1, wherein a read-access style associated with the data container is one of the ~~one or more~~ plurality of factors used to select the amount of readahead data.

7. (Original): The method of claim 6, wherein the selected amount of readahead data equals zero if the read-access style corresponds to a random read-access style.

8. (Currently Amended): The method of claim 1, wherein a number of client read requests processed in the read stream is one of the ~~one or more~~ plurality of factors used to select the amount of readahead data.

9. (Original): The method of claim 8, wherein the number of client read requests processed in the read stream is stored as a count value in a readset data structure associated with the read stream.

10. (Currently Amended): The method of claim 1, wherein the amount of client-requested data is one of the ~~one or more~~ plurality of factors used to select the amount of readahead data.

11. (Original): The method of claim 10, wherein the selected amount of readahead data is set equal to a predetermined upper limit for large amounts of client-requested data.

12. (Original): The method of claim 1, wherein the selected amount of readahead data is doubled if the number of client read requests processed in the read stream is greater than a first threshold value.

13. (Original): The method of claim 1, wherein the client-requested data is identified as read-once data when either (i) the number of client read requests processed in the read

3   stream is greater than a second threshold value or (ii) a set of metadata associated with

4   the read stream indicates that the client-requested data is read-once data.

1   14. (Original): The method of claim 1, wherein the selected amount of readahead data is

2   stored in one or more buffers enqueued on a flush queue, the flush queue being config-

3   ured to reuse buffers after a predetermined period of time.

1   15. (Original): The method of claim 14, wherein the predetermined period of time

2   equals two seconds.

1   16. (Currently Amended): An apparatus configured to implement a storage operating

2   system that optimizes the amount of readahead data retrieved for a read stream estab-

3   lished in a data container stored in the apparatus, the apparatus comprising:

4   means for receiving a client read request, the client read request indicating client-

5   requested data for the storage operating system to retrieve from the data container con-

6   taining the read stream;

7   means for determining whether the storage operating system is permitted to re-

8   trieve readahead data from the data container in response to the received client read re-

9   quest;

10   means for selecting an amount of readahead data to retrieve from the data con-

11   tainer based on ~~one or more~~ a plurality of factors; and

12   means for retrieving the selected amount of readahead data from the data con-

13   tainer.

1   17. (Original): The apparatus of claim 16, wherein the data container is a file, directory,

2   vdisk or lun.

1 18. (Original): The apparatus of claim 16, wherein the storage operating system is de-

2 termined to be permitted to retrieve readahead data from the data container when the cli-

3 ent-requested data extends the read stream past a predetermined next readahead value.

1 19. (Original): The apparatus of claim 18, further comprising means for updating the

2 predetermined next readahead value based on a percentage of the selected amount of

3 readahead data.

1 20. (Currently Amended): The apparatus of claim 16, wherein the ~~one or more~~ plurality

2 of factors used to select the amount of readahead data includes at least one of:

3   (i) the amount of client-requested data,

4   (ii) a number of client read requests processed in the read stream, and

5   (iii) a read-access style associated with the data container.

1 21. (Original): The apparatus of claim 16, wherein the selected amount of readahead

2 data is doubled if the number of client read requests processed in the read stream is

3 greater than a first threshold value.

1 22. (Currently Amended): A storage system configured to optimize the amount of reada-

2 head data retrieved for a read stream established in a data container stored in the storage

3 system, the storage system comprising:

4   a network adapter for receiving a client read request, the client read request indi-

5 cating client-requested data to retrieve from the data container containing the read stream;

6 and

7   a memory configured to store instructions for implementing a storage operating

8 system that performs the steps of:

9   determining whether the storage operating system is permitted to retrieve

10   readahead data from the data container in response to the received client read re-

11   quest, and

12   if it is determined that the storage operating system is permitted to retrieve

13   readahead data from the data container:

14   (i)   selecting an amount of readahead data to retrieve from the

15   data container based on ~~one or more~~ a plurality of factors; and

16   (ii)   retrieving the selected amount of readahead data from the

17   data container.

1   23. (Original): The storage system of claim 22, wherein the data container is a file, di-

2   rectory, vdisk or lun.

1   24. (Original): The storage system of claim 22, wherein the storage operating system is

2   determined to be permitted to retrieve readahead data from the data container when the

3   client-requested data extends the read stream past a predetermined next readahead value.

1   25. (Original): The storage system of claim 24, wherein the predetermined next reada-

2   head value is updated based on a percentage of the selected amount of readahead data.

1   26. (Currently Amended): The storage system of claim 22, wherein the ~~one or more~~ plu-

2   rality of factors used to select the amount of readahead data includes at least one of:

3   (i) the amount of client-requested data,

4   (ii) a number of client read requests processed in the read stream, and

5   (iii) a read-access style associated with the data container.

1   27. (Original): The storage system of claim 22, wherein the selected amount of reada-

2   head data is doubled if the number of client read requests processed in the read stream is

3   greater than a first threshold value.

1   28. (Currently Amended): A computer-readable media comprising instructions for exe-

2   cution in a processor for the practice of a method for a storage operating system imple-

3 mented in a storage system to optimize the amount of readahead data retrieved for a read

4 stream established in a data container stored in the storage system, the method compris-

5 ing:

6 receiving a client read request at the storage system, the client read request indi-

7 cating client-requested data for the storage operating system to retrieve from the data

8 container containing the read stream;

9 determining whether the storage operating system is permitted to retrieve reada-

10 head data from the data container in response to the received client read request;

11 if it is determined that the storage operating system is permitted to retrieve reada-

12 head data from the data container, performing the steps of:

13 (i) selecting an amount of readahead data to retrieve from the data container

14 based on ~~one or more~~ a plurality of factors; and

15 (ii) retrieving the selected amount of readahead data from the data container.

1 29. (Original): The computer-readable media of claim 28, wherein the data container is

2 a file, directory, vdisk or lun.

1 30. (New): The method of claim 1, wherein the retrieved readahead data is stored in one

2 or more buffers, the buffers containing a flush queue, the flush queue being configured to

3 reuse buffers after a predetermined period of time.

1 31. (New): The method of claim 30, wherein the read stream corresponds to a read-once

2 data transfer and data retrieved from the data container is stored in the flush queue.

1 32. (New): The method of claim 30, wherein the retrieved readahead data is stored in

2 the flush queue.

1 33. (New): The method of claim 30, wherein one or more buffers accessed from the

2 flush queue are re-enqueued on a normal queue.

1   34. (New): A method for optimizing readahead data retrieval for a read stream estab-

2   lished in a data container stored in a storage system, the method comprising:

3   receiving a client read request at the storage system, the client read request be-

4   longing to the read stream and indicating an amount of client-requested data;

5   selecting an amount of readahead data based on the indicated amount of client-

6   requested data; and

7   retrieving the selected amount of readahead data from the data container.

1   35. (New): The method of claim 34, wherein the selected amount of readahead data is

2   set equal to a multiple of a predetermined amount, and wherein the multiple is associated

3   with the amount of client-requested data.

1   36. (New): The method of claim 34, wherein the selected amount of readahead data is

2   set equal to a multiple of the amount of client-requested data.

1   37. (New): The method of claim 36, further comprising the step of rounding the selected

2   amount of readahead data to the size of a data block.

1   38. (New): The method of claim 34, wherein the selected amount of readahead data is

2   set equal to a predetermined upper limit.

1   39. (New): A method for optimizing readahead data retrieval for a read stream estab-

2   lished in a data container stored in a storage system, the method comprising:

3   receiving a client read request at the storage system, the client read request be-

4   longing to the read stream and indicating client-requested data;

5   selecting an amount of readahead data based on a read-access style associated

6   with the data container; and

7   retrieving the selected amount of readahead data from the data container.

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1   40. (New): The method of claim 39, wherein the selected amount of readahead data

2   equals zero if the read-access style corresponds to a random read-access style.

1   41. (New): A method for optimizing readahead data retrieval for a read stream estab-

2   lished in a data container stored in a storage system associated with a number of storage

3   devices, the method comprising:

4   receiving a client read request at the storage system, the client read request be-

5   longing to the read stream and indicating client-requested data;

6   selecting an amount of readahead data based on the number of storage devices;

7   and

8   retrieving the selected amount of readahead data from the data container.

1   42. (New): The method of claim 41, wherein the step of selecting an amount of reada-

2   head data further comprises:

3   determining whether a flag is associated with the read stream, the flag indicating

4   that the storage system is associated with more than a predetermined number of storage

5   devices; and

6   in response to determining whether the flag is associated, selecting the amount of

7   readahead data.

1   43. (New): The method of claim 41, wherein the storage devices comprise one or more

2   disks.

1   44. (New): A method for optimizing readahead data retrieval for a read stream estab-

2   lished in a data container stored in a storage system, the method comprising:

3   receiving a client read request at the storage system, the client read request be-

4   longing to the read stream and indicating client-requested data;

5   selecting an amount of readahead data based on a plurality of factors; and

9

6   retrieving the selected amount of readahead data from the data container.

1   45. (New): The method of claim 44, wherein the retrieved readahead data is stored in

2   one or more buffers, the buffers containing a flush queue, the flush queue being config-

3   ured to reuse buffers after a predetermined period of time.

1   46. (New): The method of claim 45, wherein the read stream corresponds to a read-once

2   data transfer and data retrieved from the data container is stored in the flush queue.

1   47. (New): The method of claim 45, wherein the retrieved readahead data is stored in

2   the flush queue.

1   48. (New): The method of claim 45, wherein one or more buffers accessed from the

2   flush queue are re-enqueued on a normal queue.

1   49. (New): A system for optimizing readahead data retrieval for a read stream estab-

2   lished in a data container stored in a storage system, the system comprising:

3   means for receiving a client read request at the storage system, the client read re-

4   quest belonging to the read stream and indicating client-requested data;

5   means for selecting an amount of readahead data based on a plurality of factors;

6   and

7   means for retrieving the selected amount of readahead data from the data con-

8   tainer.

1   50. (New): The system of claim 49, wherein the retrieved readahead data is stored in

2   one or more buffers, the buffers containing a flush queue, the flush queue being config-

3   ured to reuse buffers after a predetermined period of time.

1 51. (New): <u>The system of claim 50, wherein the read stream corresponds to a read-once</u>

2 <u>data transfer and data retrieved from the data container is stored in the flush queue.</u>

1 52. (New): <u>The system of claim 50, wherein the retrieved readahead data is stored in the</u>

2 <u>flush queue.</u>

1 53. (New): <u>The system of claim 50, wherein one or more buffers accessed from the</u>

2 <u>flush queue are re-enqueued on a normal queue.</u>